

L Number	Hits	Search Text	DB	Time stamp
1	83	4879215.pn. or 4945205.pn. or 4960691.pn. or 4756828.pn. or 4757004.pn. or 4883688.pn. or 5137808.pn. or 5089391.pn. or 5087556.pn. or 5051237.pn. or 5028535.pn. or 5023054.pn. or 4863498.pn. or 4906439.pn. or 4426451.pn. or 5458852.pn. or 4233029.pn. or 4829010.pn. or 4911782.pn. or 5202268.pn. or 5486335.pn. or 5006309.pn. or 4591570.pn. or 4916056.pn. or 4877586.pn. or 4857453.pn. or 4727019.pn. or 4435504.pn. or 4695554.pn. or 4859613.pn. or 5155212.pn. or 5766961.pn. or 4978503.pn. or 5885527.pn. or 6019944.pn. or 4756884.pn. or 4948961.pn. or 5004923.pn. or 5300779.pn. or 5144139.pn. or 5147607.pn. or 5164598.pn. or 5204525.pn. or 5209904.pn.	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2003/07/18 06:15
2	44	4879215.pn. or 4945205.pn. or 4960691.pn. or 4756828.pn. or 4757004.pn. or 4883688.pn. or 5137808.pn. or 5089391.pn. or 5087556.pn. or 5051237.pn. or 5028535.pn. or 5023054.pn. or 4863498.pn. or 4906439.pn. or 4426451.pn. or 5458852.pn. or 4233029.pn. or 4829010.pn. or 4911782.pn. or 5202268.pn. or 5486335.pn. or 5006309.pn. or 4591570.pn. or 4916056.pn. or 4877586.pn. or 4857453.pn. or 4727019.pn. or 4435504.pn. or 4695554.pn. or 4859613.pn. or 5155212.pn. or 5766961.pn. or 4978503.pn. or 5885527.pn. or 6019944.pn. or 4756884.pn. or 4948961.pn. or 5004923.pn. or 5300779.pn. or 5144139.pn. or 5147607.pn. or 5164598.pn. or 5204525.pn. or 5209904.pn.	USPAT	2003/07/18 06:16
3	42816	hydrophobic and hydrophilic	USPAT	2003/07/18 06:17
4	17	(4879215.pn. or 4945205.pn. or 4960691.pn. or 4756828.pn. or 4757004.pn. or 4883688.pn. or 5137808.pn. or 5089391.pn. or 5087556.pn. or 5051237.pn. or 5028535.pn. or 5023054.pn. or 4863498.pn. or 4906439.pn. or 4426451.pn. or 5458852.pn. or 4233029.pn. or 4829010.pn. or 4911782.pn. or 5202268.pn. or 5486335.pn. or 5006309.pn. or 4591570.pn. or 4916056.pn. or 4877586.pn. or 4857453.pn. or 4727019.pn. or 4435504.pn. or 4695554.pn. or 4859613.pn. or 5155212.pn. or 5766961.pn. or 4978503.pn. or 5885527.pn. or 6019944.pn. or 4756884.pn. or 4948961.pn. or 5004923.pn. or 5300779.pn. or 5144139.pn. or 5147607.pn. or 5164598.pn. or 5204525.pn. or 5209904.pn.) and (hydrophobic and hydrophilic)	USPAT	2003/07/18 06:24
5	35578	differential with flow	USPAT	2003/07/18 06:24
6	456	((hydrophobic and hydrophilic) and (differential with flow))	USPAT	2003/07/18 06:25
7	57805	422/\$.ccls.	USPAT	2003/07/18 06:25
8	72	((hydrophobic and hydrophilic) and (differential with flow)) and 422/\$.ccls.	USPAT	2003/07/18 06:25
9	4314	422/55-61.ccls.	USPAT	2003/07/18 06:26

10	19	((hydrophobic and hydrophilic) and (differential with flow)) and 422/55-61.ccls.	USPAT	2003/07/18 07:40
11	79	buechler.in.	USPAT	2003/07/18 07:40
12	24	(hydrophobic and hydrophilic) and buechler.in.	USPAT	2003/07/18 07:44

US-PAT-NO: 6156270

DOCUMENT-IDENTIFIER: US 6156270 A

TITLE: Diagnostic devices and apparatus for  
the controlled movement of reagents without  
membranes

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INVENTOR-INFORMATION:

NAME	CITY
STATE ZIP CODE COUNTRY	
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N/A N/A	

US-CL-CURRENT: 422/58, 422/61 , 422/82.05 , 436/165 ,  
436/524 , 436/531

#### CLAIMS:

What is claimed is:

1. An analytical device for determining the presence or amount of a target ligand in a test sample, said device comprising:

one or more channels; and

an array of texture structures in fluid communication with at least one channel, each texture structure comprising a surface which comprises an immobilized ligand receptor covalently or non-covalently attached thereto, said immobilized ligand receptor capable of binding a target ligand,

whereby when test sample containing target ligand flows through said channel(s), said target ligand diffuses across the width of said channel(s) and

binds to said ligand receptor immobilized on said texture structure.

2. The analytical device of claim 1 wherein said texture structures are made with copolymers, blends, laminates, metallized foils, metallized films or metals deposited on a material selected from the group consisting of

polyolefins, polyesters, styrene containing polymers, polycarbonate, acrylic polymers, chlorine containing polymers, acetal homopolymers and copolymers, cellulosics and their esters, cellulose nitrate, fluorine containing polymers, polyamides, polyimides, polymethylmethacrylates, sulfur containing polymers, polyurethanes, silicon containing polymers, glass, silicone, and ceramic materials.

3. The device of claim 1 wherein the target ligand is an analyte, analyte conjugate, analyte-analog, analyte-analog conjugate, ancillary binding member, or labeled reagent.

4. The analytical device of claim 3 wherein said analyte is an antigen, nucleotide sequence, lectin, or avidin and said immobilized reagent is selected from the group consisting of antibody, complementary nucleotide sequence, carbohydrate or biotin.

5. The analytical device of claim 1 wherein said texture structures are made with plastics which are capable of being milled or injection molded or from surfaces of copper, silver and gold films upon which are adsorbed various long chain alkanethiols.

6. The analytical device of claim 5 wherein said structures comprise a plastic which is capable of being milled or injection molded.

7. The analytical device of claim 1 wherein said texture structures are similarly shaped, said shapes selected from the group consisting of diamonds, hexagons, octagons, rectangles, squares, circles, semi-circles, triangles and ellipses.

8. The analytical device of claim 7 wherein said array of texture structures are staggered relative to the direction of test sample flow.

9. The analytical device of claim 1 wherein said array of texture structures have one or more immobilized ligand receptors, each ligand receptor capable of binding a different target ligand, thereby permitting testing for two or more target ligands in said test sample.

10. The analytical device of claim 1 further comprising a reservoir for the addition of the test sample, said reservoir comprising a plurality of pathways each of which leads to an array of texture structures, said pathways capable of transporting the test sample from said reservoir to said array.

11. The analytical device of claim 1 wherein said texture structures are made with a plastic, elastomer, latex, silicon chip, or metal.

12. The analytical device of claim 11 wherein said texture structures are made with a material selected from the group consisting of fluoropolymer resin, polystyrene, polyacrylate, polycarbonate, polyethylene, polypropylene, silicon elastomers, polystyrene latex and hydrophobic polymers.

13. The analytical device of claim 12 wherein said texture structures are made with a hydrophobic polymer which comprises polypropylene, polyethylene, or

polyester.

14. The analytical device of claim 1, comprising a zone, wherein said zone comprises:

a region capable of having a fluid placed thereon, and

a hydrophobic region adjacent to the region capable of containing a fluid placed thereon, whereby the hydrophobic region impedes the flow of fluid into that hydrophobic region.

15. The analytical device of claim 14, wherein said region capable of having a fluid placed thereon is a surface of a chamber,

wherein said chamber comprises at least one rectilinear angle when viewed along a cross section, and

wherein said hydrophobic region is comprised within the chamber adjacent the angle of the chamber.

16. The analytical device of claim 14, wherein said region capable of having a fluid placed thereon further comprises a post,

wherein said post is substantially perpendicular to a floor of this region; and

wherein said post defines a rectilinear angle between a surface of the post and the floor.

17. The analytical device of claim 1, comprising a capillary space and a material configured to fit into said capillary space, wherein said material comprises a hydrophobic zone on a surface thereof.

18. The analytical device of claim 17, wherein said hydrophobic zone covers 1% to 90% of a surface of said material.

19. The analytical device of claim 17, wherein said material comprises a filter, membrane or mesh.

20. The analytical device of claim 17, wherein said material is capable of fitting into said capillary space,

wherein said capillary space comprises at least one rectilinear angle, and

wherein hydrophobic surface of said material is capable of being placed adjacent said angle of the capillary space.

21. The analytical device of claim 1, comprising a capillary space having a lumen,

wherein said lumen comprises at least one rectilinear angle when viewed in a cross section, and

wherein said capillary space comprises a hydrophobic zone on a luminal surface.

22. The analytical device of claim 21, wherein said hydrophobic zone borders said rectilinear angle.

23. The analytical device of claim 21, wherein said hydrophobic zone substantially covers a surface adjacent said rectilinear angle.

24. The analytical device of claim 21, wherein said hydrophobic zone covers 1% to 90% of a surface adjacent said rectilinear angle.

25. The analytical device of claim 21, wherein said hydrophobic zone is adjacent to a hydrophilic surface.

26. An analytical device for determining a presence or amount of a ligand in a test sample, said device comprising:

an inlet port and a vent;

one or more channels;

an array of texture structures in fluid communication with at least one channel, each texture structure having a surface comprising an immobilized receptor covalently or non-covalently attached to said surface of said texture structure, said receptor capable of binding a ligand, whereby when said test sample containing a ligand flows through said channel(s), said ligand diffuses across the width of said channel(s) to bind said receptor immobilized on said texture structure; and,

a labeled reagent comprising a specific binding member conjugated to a detectable label, said labeled reagent capable of producing a signal at said receptor immobilized on said texture structure to indicate the presence or amount of a ligand in a test sample.

27. The device of claim 26 wherein said ligand is an analyte, analyte conjugate, analyte-analog, analyte-analog conjugate, or ancillary binding member.

28. An assay device comprising:

a sample addition reservoir;

a sample reaction barrier fluidly connected to said sample addition reservoir;

a reaction chamber fluidly connected to said sample reaction barrier, said chamber having at least two fingers in walls thereof, wherein said barrier has a higher capillarity than said reaction chamber;

a time gate fluidly connected to the reaction chamber, said time gate



capable of permitting fluid to pass therethrough at a desired flow rate;

a diagnostic element fluidly connected to the time gate, said diagnostic element comprising an array of texture structures capable of immobilizing at least one conjugate in at least one zone; and,

a used reagent reservoir fluidly connected to said diagnostic element, whereby fluid can flow in sequence from said sample addition reservoir, to said barrier, to said reaction chamber, to said time gate, to said diagnostic element then to said used reagent reservoir.

29. The device of claim 28 wherein the sample addition reservoir comprises a filter capable of separating particulate matter from a fluid sample.

30. The device of claim 28 wherein the sample reaction barrier comprises a plurality of texture structures on a surface thereof, wherein said texture structures have a texture height of 0.01 to 0.02 mm, a width of 0.10 to 0.20 mm, and a distance between adjacent texture structures is 0.08 to 0.10 mm.

31. The device of claim 28 wherein the reaction barrier comprises a capillary space having a height of about 0.03 to 0.07 mm.

32. The device of claim 28 wherein the reaction barrier comprises a corner, and comprises a hydrophobic zone at said corner.

33. The device of claim 28 wherein the reaction barrier comprises 10 vertical grooves, wherein each said groove is about 0.02 to 0.03 mm high, and each said groove is spaced about 0.5 to 1.5 mm apart.

34. The device of claim 28 wherein the reaction chamber comprises a capillary space about 0.03 to 1.0 mm high and a volume of

about 0.2 to 6  $\mu\text{m}$ .

35. The device of claim 28 wherein the reaction chamber comprises a plurality of texture structures, wherein each of said texture structures are posts about 0.015 to 0.03 mm high, with a diameter of about 0.05 to 0.1 mm, and wherein adjacent posts are spaced about 0.015 to 0.025 mm apart.

36. The device of claim 28 wherein the reaction chamber comprises a plurality of grooves oriented perpendicular to a predominant direction of fluid flow, wherein each of said grooves is about 0.03 to 0.07 mm high, and adjacent grooves are about 0.08 to 0.12 mm apart.

37. The device of claim 28 wherein the reaction chamber comprises an edge or corner, and comprises a hydrophobic zone at said edge or corner.

38. The device of claim 28 wherein the time gate comprises a height of about 0.02 to 0.12 mm, and a plurality of grooves oriented perpendicular to a predominant direction of fluid flow, wherein each of said grooves is about 0.03 to 0.07 mm high and adjacent grooves are about 0.08 to 0.12 mm apart.

39. The device of claim 28 wherein the diagnostic element comprises a height of about 0.01 to 0.05 mm, a volume of about 0.5 to 3  $\mu\text{m}^3$ .

40. The device of claim 28 wherein each of said texture structures is about 0.01 to 0.02 mm high, a diameter of about 0.03 to 0.07 mm, and adjacent texture structures are about 0.04 to 0.09 mm apart.

41. The device of claim 28 wherein the diagnostic element comprises an edge or corner, and comprises a hydrophobic zone at said edge or corner.

42. The device of claim 28 wherein the used reagent reservoir comprises a height of about 0.01 to 0.05 mm, a volume of greater than about 1 .mu.l.

43. The device of claim 28 wherein the used reagent reservoir comprises a plurality of texture structures, wherein each said texture structure comprises a height of 0.01 to 0.02 mm, a diameter of 0.03 to 0.07 mm, and wherein adjacent texture structures are about 0.04 to 0.09 mm apart.

44. The device of claim 28 further comprising a dead space region positioned between a surface of the diagnostic element and a surface of the used reagent reservoir.